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TIME/AREA DISTRIBUTION AND COMPOSITION OF THE INCIDENTAL KILL OF SMALL CETACEANS IN THE U.S. PURSE-SEINE FISHERY FOR TUNA IN THE EASTERN TROPICAL PACIFIC DURING 1981

by

C. W. OLIVER, G. J. WALKER, AND R. B. MILLER

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INTRODUCTION

Data on composition of the incidental kill of small cetaceans, by the United States purse-seine fishery for tuna, have been presented and analyzed in a series of publications (Perrin, Coe and Zweifel, 1976; Perrin, Holts and Miller, 1977; Perrin, Miller and Sloan, 1977; Perrin and Henderson, 1979; Smith, 1979; Henderson, Perrin and Miller, 1980; and Perrin and Oliver, 1981). Prior to January 1979, the sole source of data on the incidental kill, by U. S. registered vessels, was provided by the National Marine Fisheries Service (NMFS) Tuna/Porpoise Observer Program. Since then, the Inter-American Tropical Tuna Commission (IATTC) has conducted Tuna-Dolphin Investigations on both U. S. and foreign-registered vessels. The purpose of this paper is to present the data available to NMFS from both sources for the year 1981.

Data on incidental kill and sex composition, by time and area, were collected by NMFS fishery technicians aboard U.S.-registered vessels. The field data form used by these technicians was shown in Perrin and Oliver (1982), and the data are herein referred to as "tally data". Data on the sex composition, reproductive condition and length frequencies of the kill were collected by both NMFS and IATTC technicians aboard U.S.-registered vessels, using the field data form shown in Perrin and Oliver (1982). These latter data are herein referred to as "life history data". Data on the sex composition of the kill, by time and area, are obtained from both of these sources. The sampling scheme used to place observers aboard vessels was described in Smith (1979).

The laboratory procedures for processing specimens and the criteria for determining sexual maturity were described in Perrin, Coe and Zweifel (1976) and Perrin, Holts and Miller (1977). The computer programs used to summarize data on reproductive condition were described by Henderson and Perrin (1980). The management units (stocks) used here were defined in Smith (1979). Since most stocks are delineated geographically, we excluded specimens for which the collection position was unavailable. The data on kill and sex composition are presented by 5^{o} square areas (Figures 1-3).

RESULTS AND DISCUSSION

During the year 1981, there were 41 NMFS-observed cruises operating in the eastern tropical Pacific. Of these, 33 provided data on incidental kill (tally data: 3297 specimens) and 31 contributed data on the reproductive condition and length frequencies of the kill (life history data: 725 specimens). Concurrent with this effort there, were 60 IATTC-observed cruises, of which 43 provided life history data (566 specimens).

Incidental kill data, by month and area, are presented for all the 3297 small cetaceans reported by NMFS technicians from the tally data source in Tables 1-5. Sex data, by quarter of the year and area, as retrieved from the tally source are presented for 1454 dolphins in Tables 6-10. Sex data are also presented for 1267 specimens obtained from the life history source in Tables 11-15. Length-frequency data for 1260 male and female dolphins are presented in Tables 16-18, and reproductive-condition data for 619 females in Table 19.

Tally data on the incidental kill and sex composition of small cetaceans in the eastern tropical Pacific by the U.S. tuna puse-seine fleet are reported herein for 33 of 76 cruises on which either NMFS or IATTC fishery technicians were aboard and tally data collected. An overlapping set of sex-composition data are presented for 74 cruises where either observers were aboard and life history data were collected. A chi-squared test, by stock for all areas and months combined, between the two data sources did not show a significant difference between the sex compositions, with the exception of the spinner "all stocks" category. For that category, the chi-squared value was 4.68, exceeding the 0.05 critical value of 3.84 for 1 degree of freedom. The actual five-degree areas sampled between the two data sources are not exactly the same (Figures 2 and 3). This may be due in part to a slight westward extension of the fishing effort from that reported for 1979-1980 (Perrin and Oliver, 1982). Perrin and Oliver discussed a number of biases inherent in both of these data sources. There may also exist bias between these sources. Further analyses, by time and area sampled are required to determine with confidence the comparability of the two data sets.

Note is made of the occurrence of larger specimens for all identified stocks of spinner dolphins (Table 16) and northern tropical common dolphin (Table 17) than reported by Perrin and Oliver (1982). A single male northern offshore spotted dolphin with a length of 240 cm was the largest specimen of that stock reported to date. The next largest specimen was only 227 cm long, leaving open the possibility that a measurement error was involved.

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The owners, captains and crews of the U.S. tuna purse-seine fleet cooperated fully with the collection of data and specimens. We thank them and the many NMFS and IATTC fishery technicians who carried out the field work. V. L. Cass assisted in the processing of specimens in the laboratory. K. M. Chevalier assisted in the preparation of the tables. H. M. Orr prepared the figures, and H. Becker typed the manuscript.

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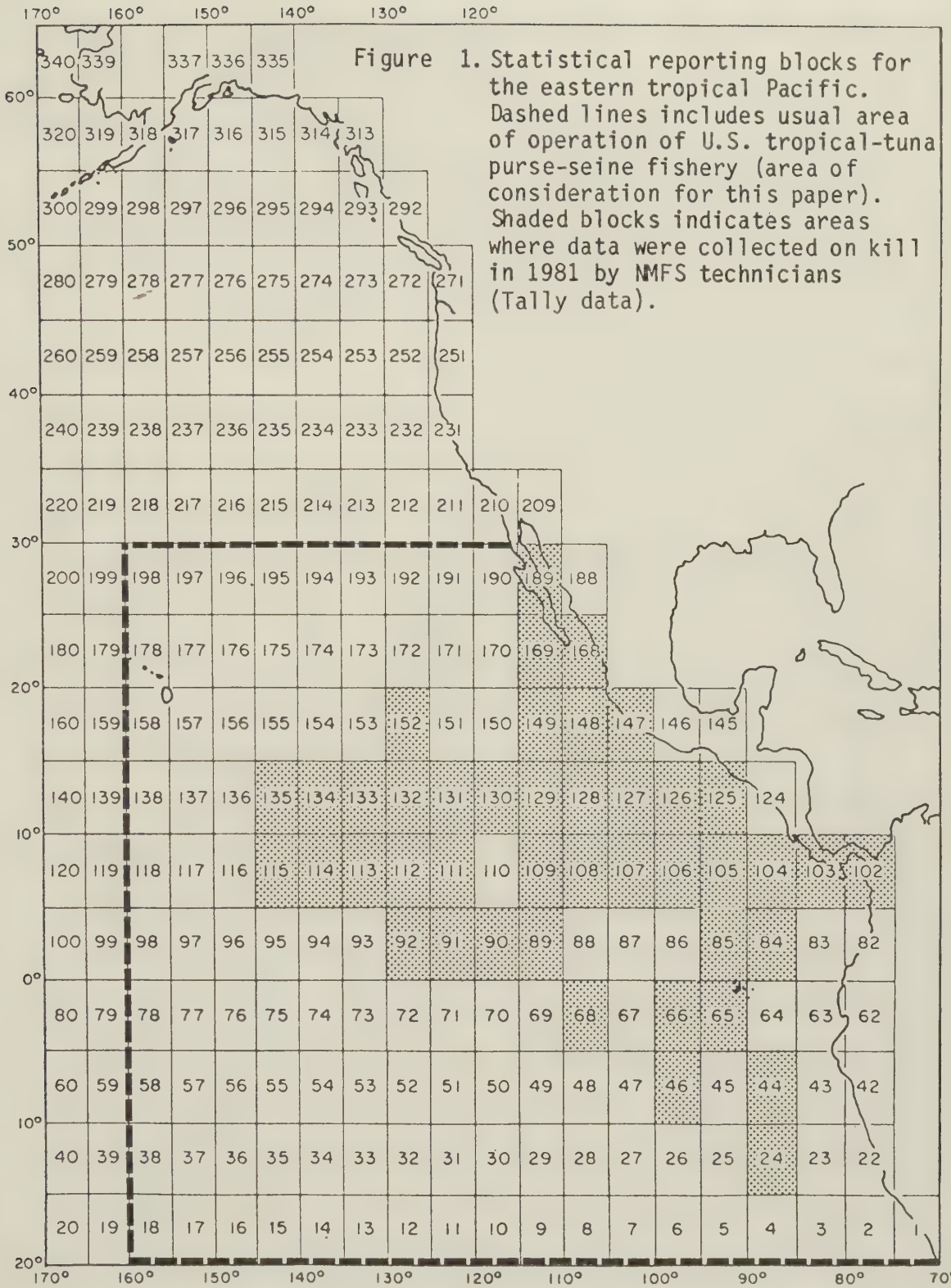

Figure 1. Statistical reporting blocks for the eastern tropical Pacific. Dashed lines includes usual area of operation of U.S. tropical-tuna purse-seine fishery (area of consideration for this paper). Shaded blocks indicates areas where data were collected on kill in 1981 by NMFS technicians (Tally data).

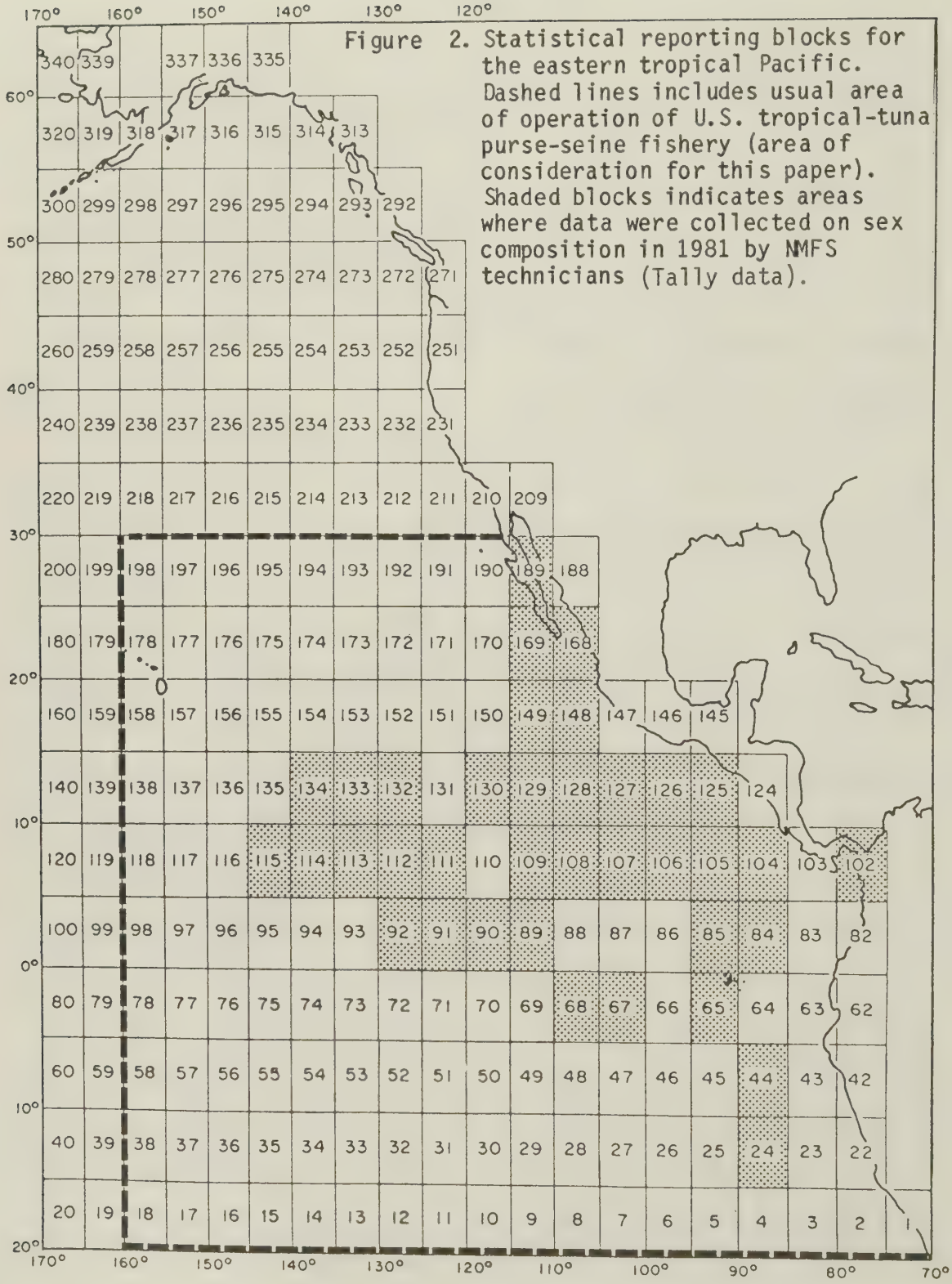

Figure 2. Statistical reporting blocks for the eastern tropical Pacific. Dashed lines includes usual area of operation of U.S. tropical-tuna purse-seine fishery (area of consideration for this paper). Shaded blocks indicates areas where data were collected on sex composition in 1981 by NMFS technicians (Tally data).

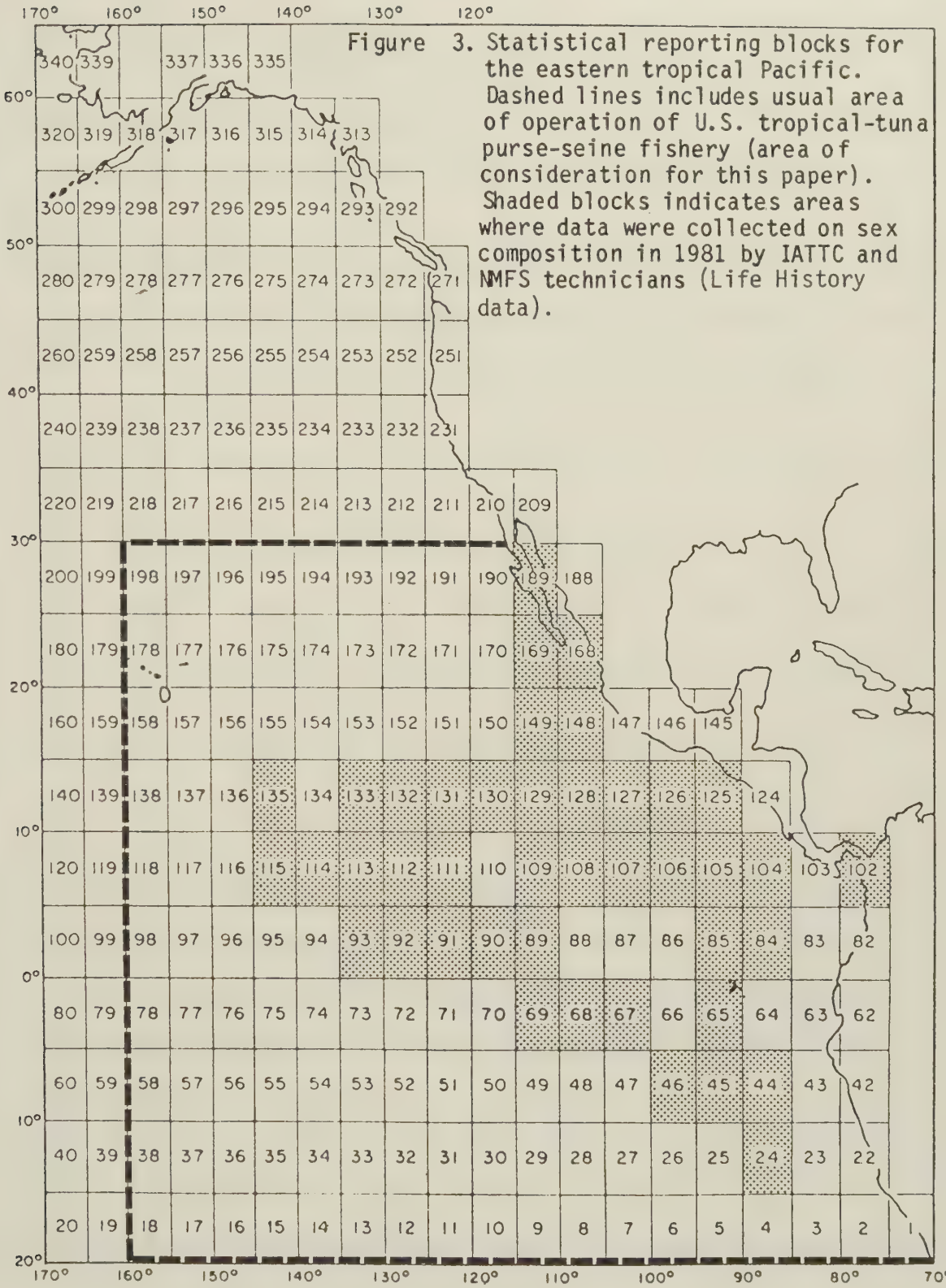

Figure 3. Statistical reporting blocks for the eastern tropical Pacific. Dashed lines includes usual area of operation of U.S. tropical-tuna purse-seine fishery (area of consideration for this paper). Shaded blocks indicates areas where data were collected on sex composition in 1981 by IATTC and NMFS technicians (Life History data).

SPECIES AND STOCK	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Spotted dolphin:														
Northern Offshore	84	0	0	0	0	0	0	0	0	3	0	0	0	3
	85	0	0	5	0	0	0	0	0	0	0	0	0	5
	89	0	0	0	0	0	8	0	0	0	0	0	0	8
	90	0	0	0	0	179	0	0	0	0	0	0	0	179
	91	0	0	0	2	454	0	0	0	11	0	2	0	469
	92	0	0	0	0	7	0	0	0	6	0	0	0	13
	104	0	0	13	0	0	0	0	2	0	0	0	1	16
	105	0	0	3	0	0	0	0	0	0	0	0	3	6
	106	6	2	0	13	11	0	0	0	0	1	3	12	48
	107	0	0	14	0	0	0	0	1	0	3	6	0	24
	108	0	0	2	0	0	0	0	1	0	0	0	0	3
	109	0	0	0	0	0	0	36	4	0	0	0	0	40
	111	0	0	0	1	1	0	4	0	0	0	0	0	6
	112	0	0	0	0	0	5	43	0	0	0	0	0	48
	113	0	0	0	0	1	10	23	0	0	0	0	0	34
	114	0	0	0	0	0	48	27	1	0	0	0	0	76
	115	0	0	0	0	0	72	7	0	0	0	0	0	79
	125	0	0	0	0	0	0	8	0	0	0	0	0	8
	126	3	0	14	1	11	0	0	3	0	0	0	0	32
	127	11	1	3	0	27	0	0	2	1	0	76	0	121
	128	17	0	5	7	3	0	18	0	3	0	6	111	170
	129	0	0	2	0	3	71	9	0	12	0	0	0	97
	130	0	0	0	0	0	2	3	0	0	0	0	0	5
	131	0	0	0	0	0	0	0	21	0	0	0	0	21
	132	0	0	0	0	0	3	0	17	6	0	0	0	26
	133	0	0	0	0	2	4	36	16	0	0	0	0	58
	134	0	0	0	0	25	0	0	0	0	0	0	0	25
	135	0	0	0	0	0	0	1	0	0	0	0	0	1
	147	0	0	1	0	0	0	0	0	0	0	0	0	1
	148	0	0	6	0	2	0	3	0	0	0	0	0	11
	149	0	0	0	1	2	0	0	0	6	1	3	0	13
	168	0	0	0	0	0	0	66	0	0	0	0	0	66
	TOTAL	37	3	68	25	728	223	284	68	48	5	96	127	1712
Southern Offshore	24	267	0	0	0	0	0	0	0	0	0	0	0	267
	44	2	1	0	0	0	0	0	0	0	0	0	0	3
	46	0	0	0	0	0	0	0	0	0	0	0	7	7
	65	0	0	0	0	0	0	0	0	0	0	0	3	3
	66	0	0	0	0	0	0	0	0	0	0	0	6	6
	67	0	0	0	0	0	0	0	0	0	0	0	5	5
	68	0	0	0	0	0	0	3	0	0	0	0	0	3
	TOTAL	269	1	0	0	0	0	3	0	0	0	0	21	294
Unidentified to Stock	102	0	0	0	0	0	0	0	0	6	0	0	0	6
	TOTAL	0	0	0	0	0	0	0	0	6	0	0	0	6
All Stocks	TOTAL	306	4	68	25	728	223	287	68	54	5	96	148	2012

Table 1. Kill data for spotted dolphin, Stenella attenuata, in the observed kill, by stock, five-degree square and month of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Spinner dolphin:														
Northern Whitebelly	90	0	0	0	0	10	1	0	0	0	0	0	0	11
	91	0	0	0	0	33	0	0	0	0	0	0	0	33
	92	0	0	0	0	5	0	0	0	0	0	0	0	5
	107	0	0	1	0	0	0	0	0	0	0	0	0	1
	109	0	0	0	0	0	4	6	0	0	0	0	0	10
	111	0	0	0	0	0	0	3	0	0	0	0	0	3
	112	0	0	0	0	0	6	4	0	0	0	0	0	10
	113	0	0	0	0	0	3	0	3	0	0	0	0	6
	114	0	0	0	0	0	14	12	0	0	0	0	0	26
	115	0	0	0	0	0	76	0	0	0	0	0	0	76
	125	0	0	0	0	0	0	2	0	0	0	0	0	2
	127	0	0	0	0	0	0	0	1	0	0	8	0	9
	128	2	0	0	0	0	0	0	0	0	0	0	0	2
	129	0	0	0	0	0	0	1	0	0	0	0	0	1
	131	0	0	0	0	0	0	0	2	0	0	0	0	2
	132	0	0	0	0	0	2	0	11	3	0	0	0	16
	133	0	0	0	0	79	20	6	27	0	0	0	0	132
	135	0	0	0	0	0	1	7	0	0	0	0	0	8
	149	0	0	0	0	0	0	0	0	2	0	0	0	2
	152	0	0	0	0	0	0	0	0	1	0	0	0	1
	TOTAL	2	0	1	0	127	127	41	44	6	0	8	0	356
Southern Whitebelly	24	260	0	0	0	0	0	0	0	0	0	0	0	260
	44	0	1	0	0	0	0	0	0	0	0	0	0	1
	46	0	0	0	0	0	0	0	0	0	0	0	23	23
	65	0	0	0	0	0	0	0	0	0	0	0	5	5
	67	0	0	0	0	0	0	0	0	0	0	0	24	24
	TOTAL	260	1	0	0	0	0	0	0	0	0	0	52	313
Eastern	84	0	0	0	0	0	0	0	0	0	0	0	2	2
	103	0	0	0	0	0	0	0	0	0	0	0	3	3
	106	0	0	0	1	0	0	0	0	0	0	0	0	1
	107	0	0	3	0	0	0	0	0	0	0	0	0	3
	113	0	0	0	0	0	0	21	0	0	0	0	0	21
	125	0	0	0	0	0	0	5	0	0	0	0	0	5
	126	5	0	0	0	1	0	0	0	0	0	0	0	6
	127	0	0	0	0	4	0	0	4	0	0	2	4	14
	128	2	0	0	13	3	0	0	0	0	0	0	133	151
	129	0	0	0	2	0	2	1	0	8	0	1	0	14
	133	0	0	0	0	2	0	0	0	0	0	0	0	2
	148	0	0	0	1	0	0	0	0	0	0	0	0	1
	149	0	0	0	0	0	0	1	0	6	0	0	0	7
	TOTAL	7	0	3	17	10	2	28	4	14	0	3	142	230
Unidentified to Stock	112	0	0	0	0	1	0	0	0	0	0	0	0	1
	113	0	0	0	0	0	0	3	0	0	0	0	0	3
	125	0	0	0	0	0	0	2	0	0	0	0	0	2
	129	0	0	0	0	0	10	0	0	0	0	0	0	10
	133	0	0	0	0	0	1	0	0	0	0	0	0	1
	TOTAL	0	0	0	0	1	11	5	0	0	0	0	0	17
All Stocks	TOTAL	269	1	4	17	138	140	74	48	20	0	11	194	916

Table 2. Kill data for spinner dolphin, Stenella longirostris in the observed kill, by stock, five-degree square and month of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Common dolphin:														
Northern Tropical	168	0	0	0	0	0	9	0	0	0	0	0	0	9
	169	0	0	0	0	0	158	60	0	0	0	0	0	218
	189	0	0	0	0	0	0	0	0	0	0	43	0	43
	TOTAL	0	0	0	0	0	167	60	0	0	0	43	0	270
Central Tropical	104	0	0	0	0	0	0	0	0	0	0	0	44	44
	105	0	0	0	0	8	0	0	0	0	0	0	0	8
	125	0	0	0	17	0	0	0	0	0	0	0	0	17
	TOTAL	0	0	0	17	8	0	0	0	0	0	0	44	69
Southern Tropical	65	0	0	0	0	0	0	0	0	0	0	0	3	3
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	3	3
All Stocks	TOTAL	0	0	0	17	8	167	60	0	0	0	43	47	342

Table 3. Kill data for common dolphin, Delphinus delphis in the observed kill, by stock, five-degree square and month of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Striped dolphin:														
Northern Tropical	148	0	0	0	0	0	6	0	0	0	0	0	0	6
	TOTAL	0	0	0	0	0	6	0	0	0	0	0	0	6
Southern Tropical	65	0	0	0	0	0	0	0	0	0	0	0	7	7
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	7	7
All Stocks	TOTAL	0	0	0	0	0	6	0	0	0	0	0	7	13

Table 4. Kill data for striped dolphin, Stenella coeruleoalba, in the observed kill, by stock, five-degree square and month of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Unidentified	106	0	0	0	1	0	0	0	0	0	0	0	0	1
	111	0	0	0	0	0	0	1	0	0	0	0	0	1
	113	0	0	0	0	0	1	0	0	0	0	0	0	1
	115	0	0	0	0	0	1	0	0	0	0	0	0	1
	128	0	0	0	0	0	0	1	0	0	0	0	1	2
	129	0	0	0	0	0	3	4	0	0	0	0	0	7
	149	0	0	0	0	0	0	0	0	0	0	1	0	1
	TOTAL	0	0	0	1	0	5	6	0	0	0	1	1	14

Table 5. Kill data for unidentified small cetaceans in the observed kill, by five-degree square and month of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Spotted dolphin:																
Northern Offshore	84	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	85	3	1	4	0	0	0	0	0	0	0	0	0	3	1	4
	89	0	0	0	1	6	7	0	0	0	0	0	0	1	6	7
	90	0	0	0	71	85	156	0	0	0	0	0	0	71	85	156
	91	0	0	0	46	72	118	1	8	9	1	0	1	48	80	128
	92	0	0	0	2	5	7	0	6	6	0	0	0	2	11	13
	104	2	3	5	0	0	0	0	2	2	0	1	1	2	6	8
	105	1	1	2	0	0	0	0	0	0	1	1	2	2	2	4
	106	1	5	6	7	6	13	0	0	0	5	9	14	13	20	33
	107	1	1	2	0	0	0	0	0	0	1	4	5	2	5	7
	108	1	0	1	0	0	0	0	1	1	0	0	0	1	1	2
	109	0	0	0	0	0	0	7	28	35	0	0	0	7	28	35
	111	0	0	0	1	0	1	0	2	2	0	0	0	1	2	3
	112	0	0	0	2	1	3	26	15	41	0	0	0	28	16	44
	113	0	0	0	3	8	11	4	4	8	0	0	0	7	12	19
	114	0	0	0	15	32	47	3	5	8	0	0	0	18	37	55
	115	0	0	0	27	28	55	0	0	0	0	0	0	27	28	55
	125	0	0	0	0	0	0	2	3	5	0	0	0	2	3	5
	126	6	1	7	5	6	11	1	2	3	0	0	0	12	9	21
	127	3	8	11	1	6	7	1	1	2	5	16	21	10	31	41
	128	4	1	5	1	3	4	5	16	21	30	43	73	40	63	103
	129	1	0	1	26	26	52	3	7	10	0	0	0	30	33	63
	130	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	132	0	0	0	0	0	0	2	4	6	0	0	0	2	4	6
	133	0	0	0	0	1	1	2	0	2	0	0	0	2	1	3
	134	0	0	0	6	16	22	0	0	0	0	0	0	6	16	22
	148	0	0	0	1	0	1	0	3	3	0	0	0	1	3	4
	149	0	0	0	0	1	1	1	1	2	1	1	2	2	3	5
	168	0	0	0	0	0	0	0	3	3	0	0	0	0	3	3
	TOTAL	23	21	44	215	303	518	59	111	170	44	75	119	341	510	851
Southern Offshore	24	6	9	15	0	0	0	0	0	0	0	0	0	6	9	15
	44	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3
	67	0	0	0	0	0	0	0	0	0	0	2	2	0	2	2
	68	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	TOTAL	9	9	18	0	0	0	1	0	1	0	2	2	10	11	21
Unidentified to Stock	102	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2
	TOTAL	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2
All Stocks	TOTAL	32	30	62	215	303	518	60	113	173	44	77	121	351	523	874

Table 6. Sex data for spotted dolphin, Stenella attenuata, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Spinner dolphin:																
Northern Whitebelly	90	0	0	0	5	5	10	0	0	0	0	0	0	5	5	10
	91	0	0	0	15	11	26	0	0	0	0	0	0	15	11	26
	92	0	0	0	1	4	5	0	0	0	0	0	0	1	4	5
	109	0	0	0	0	0	0	1	2	3	0	0	0	1	2	3
	111	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2
	112	0	0	0	4	2	6	1	1	2	0	0	0	5	3	8
	113	0	0	0	1	2	3	0	0	0	0	0	0	1	2	3
	114	0	0	0	2	1	3	0	2	2	0	0	0	2	3	5
	115	0	0	0	31	26	57	0	0	0	0	0	0	31	26	57
	125	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
	127	0	0	0	0	0	0	1	0	1	4	3	7	5	3	8
	128	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	129	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	133	0	0	0	23	51	74	0	0	0	0	0	0	23	51	74
	TOTAL	2	0	2	82	102	184	4	9	13	4	3	7	92	114	206
Southern Whitebelly	24	44	68	112	0	0	0	0	0	0	0	0	0	44	68	112
	44	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	67	0	0	0	0	0	0	0	0	0	7	2	9	7	2	9
	TOTAL	44	69	113	0	0	0	0	0	0	7	2	9	51	71	122
Eastern	84	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	106	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	107	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	113	0	0	0	0	0	0	2	4	6	0	0	0	2	4	6
	125	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	126	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	127	0	0	0	0	0	0	2	1	3	3	1	4	5	2	7
	128	2	0	2	2	4	6	0	0	0	50	57	107	54	61	115
	129	0	0	0	1	1	2	0	1	1	0	1	1	1	3	4
	TOTAL	6	0	6	3	6	9	4	7	11	54	60	114	67	73	140
Unidentified to stock	112	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	113	0	0	0	0	0	0	2	1	3	0	0	0	2	1	3
	125	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	129	0	0	0	7	1	8	0	0	0	0	0	0	7	1	8
	TOTAL	0	0	0	7	2	9	2	2	4	0	0	0	9	4	13
All Stocks	TOTAL	52	69	121	92	110	202	10	18	28	65	65	130	219	262	481

Table 7. Sex data for spinner dolphin, Stenella longirostris, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Common dolphin:																
Northern Tropical	168	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
	169	0	0	0	29	17	46	2	1	3	0	0	0	31	18	49
	189	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	TOTAL	0	0	0	30	17	47	2	1	3	1	0	1	33	18	51
Central Tropical	104	0	0	0	0	0	0	0	0	0	5	4	9	5	4	9
	105	0	0	0	5	2	7	0	0	0	0	0	0	5	2	7
	125	0	0	0	8	9	17	0	0	0	0	0	0	8	9	17
	TOTAL	0	0	0	13	11	24	0	0	0	5	4	9	18	15	33
Southern Tropical	65	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
	TOTAL	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
All Stocks	TOTAL	0	0	0	43	28	71	2	1	3	7	6	13	52	35	87

Table 8. Sex data for common dolphin, Delphinus delphis, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Striped dolphin:																
Northern Tropical	148	0	0	0	2	4	6	0	0	0	0	0	0	2	4	6
	TOTAL	0	0	0	2	4	6	0	0	0	0	0	0	2	4	6
Southern Tropical	65	0	0	0	0	0	0	0	0	0	2	2	4	2	2	4
	TOTAL	0	0	0	0	0	0	0	0	0	2	2	4	2	2	4
All Stocks	TOTAL	0	0	0	2	4	6	0	0	0	2	2	4	4	6	10

Table 9. Sex data for striped dolphin, Stenella coeruleoalba, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Unidentified	128	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	149	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	TOTAL	0	0	0	0	0	0	1	0	1	0	1	1	1	1	2

Table 10. Sex data for unidentified small cetaceans in the observed kill, by five-degree square and quarter of the year for 1981. Data collected by NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1			QUARTER 2			QUARTER 3			QUARTER 4			ALL QUARTERS		
		M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Spotted dolphin:																
Northern offshore	84	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	85	6	7	13	0	0	0	0	0	0	0	0	0	6	7	13
	89	1	1	2	1	6	7	0	0	0	0	0	0	2	7	9
	90	0	0	0	25	20	45	0	0	0	0	0	0	25	20	45
	91	0	0	0	26	36	62	2	8	10	0	0	0	28	44	72
	92	0	0	0	4	3	7	9	12	21	0	0	0	13	15	28
	93	0	0	0	0	0	0	2	4	6	0	0	0	2	4	6
	102	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	104	5	9	14	0	0	0	0	2	2	4	7	11	9	18	27
	105	0	4	4	0	0	0	0	0	0	1	1	2	1	5	6
	106	13	11	24	10	8	18	5	11	16	16	22	38	44	52	96
	107	2	3	5	0	0	0	0	1	1	2	10	12	4	14	18
	108	2	2	4	0	0	0	0	3	3	0	1	1	2	6	8
	109	0	0	0	0	0	0	2	6	8	0	0	0	2	6	8
	111	0	0	0	4	9	13	0	2	2	0	0	0	4	11	15
	112	0	0	0	6	8	14	30	16	46	0	0	0	36	24	60
	113	0	0	0	19	23	42	4	6	10	0	0	0	23	29	52
	114	0	0	0	6	12	18	26	31	57	0	0	0	32	43	75
	115	0	0	0	8	9	17	0	1	1	0	0	0	8	10	18
	125	0	0	0	0	0	0	2	3	5	0	0	0	2	3	5
	126	8	3	11	5	6	11	2	2	4	1	5	6	16	16	32
	127	8	15	23	1	7	8	2	1	3	8	21	29	19	44	63
	128	8	8	16	5	8	13	5	17	22	6	4	10	24	37	61
	129	2	2	4	2	2	4	3	7	10	2	0	2	9	11	20
	130	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	131	0	0	0	0	0	0	0	3	3	0	0	0	0	3	3
	132	0	0	0	0	0	0	2	4	6	0	0	0	2	4	6
	133	0	0	0	0	1	1	3	0	3	0	0	0	3	1	4
	135	0	0	0	0	0	0	1	5	6	0	0	0	1	5	6
	148	5	6	11	3	2	5	0	3	3	0	0	0	8	11	19
	149	2	1	3	0	3	3	1	1	2	0	3	3	3	8	11
	168	0	0	0	0	0	0	0	3	3	0	0	0	0	3	3
	TOTAL	62	72	134	125	164	289	102	153	255	40	74	114	329	463	792
Southern offshore	24	6	9	15	0	0	0	0	0	0	0	0	0	6	9	15
	44	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3
	45	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1
	67	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
	68	0	0	0	0	0	0	1	0	1	7	4	11	8	4	12
	69	0	0	0	0	0	0	0	0	0	2	1	3	2	1	3
	TOTAL	10	9	19	0	0	0	1	0	1	10	7	17	21	16	37
Coastal	102	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	TOTAL	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
All Stocks	TOTAL	72	81	153	125	164	289	103	154	257	50	81	131	350	480	830

Table 11. Sex data for spotted dolphin, Stenella attenuata, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by IATTC and NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1			QUARTER 2			QUARTER 3			QUARTER 4			ALL QUARTERS		
		M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Spinner dolphin:																
Northern Whitebelly	89	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	90	0	0	0	6	4	10	0	0	0	0	0	0	6	4	10
	91	0	0	0	18	13	31	2	0	2	0	0	0	20	13	33
	92	0	0	0	1	4	5	0	0	0	0	0	0	1	4	5
	107	0	1	1	0	0	0	1	0	1	0	0	0	1	1	2
	108	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	109	0	0	0	0	0	0	2	1	3	0	0	0	2	1	3
	111	0	0	0	5	3	8	0	2	2	0	0	0	5	5	10
	112	0	0	0	9	3	12	1	1	2	0	0	0	10	4	14
	113	0	0	0	4	3	7	0	0	0	0	0	0	4	3	7
	114	0	0	0	6	5	11	2	6	8	0	0	0	8	11	19
	115	0	0	0	9	10	19	3	5	8	0	0	0	12	15	27
	125	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
	127	0	0	0	0	0	0	1	0	1	4	3	7	5	3	8
	128	3	0	3	0	0	0	0	0	0	1	0	1	4	0	4
	129	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	131	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
	133	0	0	0	1	2	3	0	0	0	0	0	0	1	2	3
	TOTAL	3	2	5	59	47	106	14	18	32	6	3	9	82	70	152
Southern Whitebelly	24	22	22	44	0	0	0	0	0	0	0	0	0	22	22	44
	44	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	46	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	67	0	0	0	0	0	0	0	0	0	9	5	14	9	5	14
	69	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	TOTAL	24	23	47	0	0	0	0	0	0	9	6	15	33	29	62
Eastern	84	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	106	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	107	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	108	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	112	0	0	0	4	0	4	0	0	0	0	0	0	4	0	4
	113	0	0	0	1	0	1	2	4	6	0	0	0	3	4	7
	125	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	126	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	127	0	0	0	1	0	1	2	1	3	5	1	6	8	2	10
	128	2	0	2	1	3	4	0	0	0	11	17	28	14	20	34
	129	4	4	8	0	0	0	0	1	1	3	2	5	7	7	14
	149	0	0	0	0	0	0	0	0	0	2	2	4	2	2	4
	TOTAL	10	4	14	7	4	11	4	7	11	23	23	46	44	38	82
Unidentified to stock	113	0	0	0	0	0	0	2	1	3	0	0	0	2	1	3
	115	0	0	0	1	2	3	0	0	0	0	0	0	1	2	3
	125	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	128	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	TOTAL	0	0	0	1	2	3	2	2	4	1	1	2	4	5	9
All Stocks	TOTAL	37	29	66	67	53	120	20	27	47	39	33	72	163	142	305

Table 12. Sex data for spinner dolphin, Stenella longirostris, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by IATTC and NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Common dolphin:																
Northern Tropical	168	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
	169	0	0	0	21	20	41	2	1	3	2	3	5	25	24	49
	189	0	0	0	0	0	0	0	0	0	12	11	23	12	11	23
	TOTAL	0	0	0	22	20	42	2	1	3	14	14	28	38	35	73
Central Tropical	104	0	0	0	0	0	0	0	0	0	5	5	10	5	5	10
	105	0	0	0	4	2	6	0	0	0	1	1	2	5	3	8
	125	0	0	0	8	9	17	1	2	3	0	0	0	9	11	20
	126	0	0	0	0	0	0	0	0	0	2	1	3	2	1	3
	TOTAL	0	0	0	12	11	23	1	2	3	8	7	15	21	20	41
Southern Tropical	65	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
	TOTAL	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
All stocks	TOTAL	0	0	0	34	31	65	3	3	6	23	23	46	60	57	117

Table 13. Sex data for common dolphin, Delphinus delphis, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by IATTC and NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Striped dolphin:																
Northern Tropical	148	0	0	0	2	4	6	0	0	0	0	0	0	2	4	6
	TOTAL	0	0	0	2	4	6	0	0	0	0	0	0	2	4	6
Central Tropical	125	0	0	0	0	0	0	1	4	5	0	0	0	1	4	5
	TOTAL	0	0	0	0	0	0	1	4	5	0	0	0	1	4	5
Southern Tropical	65	0	0	0	0	0	0	0	0	0	2	2	4	2	2	4
	TOTAL	0	0	0	0	0	0	0	0	0	2	2	4	2	2	4
All stocks	TOTAL	0	0	0	2	4	6	1	4	5	2	2	4	5	10	15

Table 14. Sex data for striped dolphin, Stenella coeruleoalba, in the observed kill, by stock, five-degree square and quarter of the year for 1981. Data collected by IATTC and NMFS observers on U. S.-registered vessels.

SPECIES AND STOCK	5-DEG SQUARE	QUARTER 1			QUARTER 2			QUARTER 3			QUARTER 4			ALL QUARTERS		
		M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Rough-toothed dolphin	126	1	3	4	0	0	0	0	0	0	0	0	0	1	3	4
	TOTAL	1	3	4	0	0	0	0	0	0	0	0	0	1	3	4
Bottlenosed dolphin	107	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	127	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	128	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	129	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	148	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	149	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	TOTAL	0	1	1	0	1	1	1	1	2	1	1	2	2	4	6

Table 15. Sex data for rough-toothed dolphin, Steno bredanenis, and bottlenosed dolphin, Tursiops truncatus, in the observed kill, by five-degree square and quarter of the year for 1981. Data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Spotted dolphins						Spinner dolphins							
	Northern Offshore		Southern Offshore		Coastal		Northern Whitebelly		Southern Whitebelly		Eastern		Unidentified	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
75-79		1						1						
80-84	3							1						
85-89	1	2					1	2						
90-94	1	2					1			1				
95-99	3	2												
100-104	1	1	1						1	1				
105-109	1	2	1								1			
110-114	1	1												
115-119											1			1
120-124	2	4									1			
125-129	2						1					1		
130-134	2	4					1	2			1	1	2	
135-139	6	4						2				1		
140-144	2	3					1	2	2	1		3		
145-149	6	9		1			6	2			1	3		1
150-154	10	4	1				7				1	2		
155-159	10	17	1	1			3	3		1	4	2		
160-164	25	22		1			5	5	1		10	10		
165-169	20	18	2	2			5	4			9	5	1	1
170-174	26	32	4				12	12	2	2	5	6	1	2
175-179	25	50	2	2			10	13	6	4	3	3		
180-184	23	56	1	3			8	8	4	4	2	1		
185-189	20	71	1	3			6	9	7	10				
190-194	18	80	2	2			9	2	5	2	3			
195-199	32	43	4	1			1	1	1	2	1			
200-204	27	11	1				3	1	3					
205-209	27	8					1		1	1	1			
210-214	17	4												
215-219	6	2												
220-224	3	1				1								
225-229	1													
230-234														
235-239														
240-244	1													
Total	322	454	21	16	0	1	81	70	33	29	44	38	4	5

Table 16. Length frequencies for 814 spotted dolphins, Stenella attenuata, and 304 spinner dolphins, Stenella longirostris, in the observed kill, by stock and sex, for 1981; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Striped dolphins						Common dolphins					
	Northern Tropical		Central Tropical		Southern Tropical		Northern Tropical		Central Tropical		Southern Tropical	
	M	F	M	F	M	F	M	F	M	F	M	F
75-79												
80-84												
85-89												
90-94							1			1		
95-99												
100-104												
105-109												
110-114												
115-119												
120-124				1								
125-129				1			1					
130-134				1								
135-139												
140-144							1	1	2			
145-149		1										
150-154												
155-159								1		1		
160-164							2	2		1		
165-169							1	3	2	1		1
170-174							5	6	1	1		
175-179					1		4	9				1
180-184		1	1				7	4				
185-189				1		2	3		1	1	1	
190-194							3		3	6		
195-199		1					2		2	3		
200-204	1	1					1	2	5	4		
205-210	1						2	1		1		
210-214					1			2	4			
215-219								2	1			
220-224							1	2				
225-229												
230-234							3					
235-239												
240-244							1					
Total	2	4	1	4	2	2	38	35	21	20	1	2

Table 17. Length frequencies for 15 striped dolphins, Stenella coeruleoalba, and 117 common dolphins, Delphinus delphis, in the observed kill, by stock and sex, for 1981; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Rough-toothed dolphin		Bottlenosed dolphin	
	M	F	M	F
150-154				
155-159		1		
165-169				
165-169				
170-174				
175-179				
180-184		1		
185-189				
190-194				
195-199				
200-204				
205-209	1	1		
210-214			1	
215-219				
220-224				
225-229				
230-234				1
235-239				1
240-244				
245-249				1
250-254				1
255-259				
260-264			1	
265-269				
270-274				
Total	1	3	2	4

Table 18. Length frequencies for 4 rough-toothed dolphins, Steno bredanensis, and 6 bottlenosed dolphins, Tursiops truncatus, in the observed kill for 1981; data collected by IATTC and NMFS observers on U.S.-registered vessels.

	Spotted		Spinner				Common			
	Northern Offshore		Eastern		Northern Whitebelly		Northern Tropical		Central Tropical	
	N	%	N	%	N	%	N	%	N	%
Maturity undetermined	223	48.9	19	50.0	30	42.9	5	14.3	9	45.0
Sexually immature	80	17.5	12	31.6	17	24.3	4	11.4	3	15.0
Sexually mature:										
Condition undetermined	3	0.7	0	0.0	1	1.4	1	2.9	0	0.0
Pregnant only	32	7.0	1	2.6	3	4.3	13	37.1	2	10.0
Pregnant and lactating	10	2.2	0	0.0	0	0.0	2	5.7	0	0.0
Lactating only	87	19.1	4	10.5	12	17.1	6	17.1	5	25.0
"Resting"										
With corpus luteum	7	1.5	0	0.0	1	1.4	1	2.9	0	0.0
Without corpus luteum	14	3.1	2	5.3	6	8.6	3	8.6	1	5.0
Post-reproductive	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	456	100.0	38	100.0	70	100.0	35	100.0	20	100.0

Table 19. Reproductive condition for 456 female spotted dolphins, Stenella attenuata, 108 spinner dolphins, Stenella longirostris, and 55 common dolphins, Delphinus delphis, in the observed kill, by stock, for 1981; data collected by IATTC and NMFS observers on U.S.-registered vessels.